



FACT SHEET

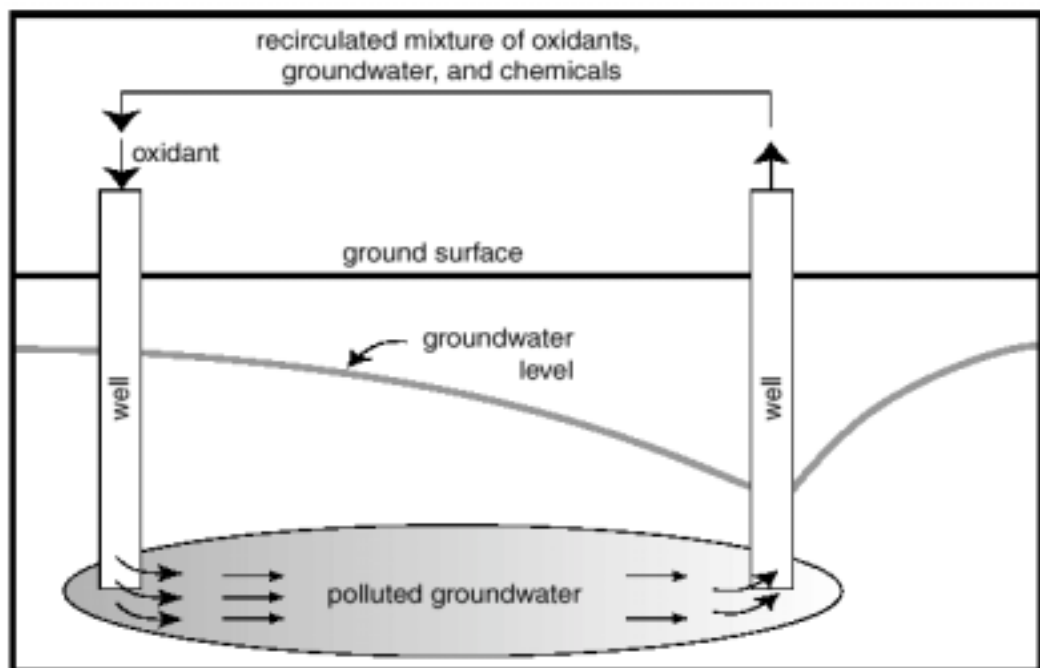
Chemical Oxidation

What is Chemical Oxidation?

Chemical Oxidation uses chemicals called oxidants to destroy contaminants that may be found in soil, sludge, and groundwater. These contaminants are destroyed by converting them to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert (harmless or non-reactive). Chemical oxidation can destroy many types of chemicals such as fuels, solvents, and pesticides.

How does Chemical Oxidation work?

Wells are drilled at different depths in the polluted area through which the oxidant is pumped into the ground. The oxidant mixes with the harmful contaminants and causes them to breakdown. A chemical (reduction/oxidation) reaction occurs, which converts the hazardous contaminant to a non-hazardous or less toxic compound by transferring the electrons from one compound to another. When the process is complete, only water and other harmless chemicals, such as carbon dioxide, are left behind.



The oxidizing agents most commonly used for treatment of hazardous contaminants are ozone, hydrogen peroxide, hypochlorites, chlorine, potassium

permanganate, and chlorine dioxide. The type and extent of the contaminant and the site conditions determines which oxidant is most appropriate for each site. A catalyst can also be used with an oxidant in the cleanup process. A catalyst speeds up the strength or speed of a process. For example, if hydrogen peroxide is mixed with an iron catalyst, a strong chemical called a free radical is produced. Free radicals can destroy more harmful contaminants than hydrogen peroxide alone.

Chemical oxidation can create enough heat to boil water. The heat can cause the contaminants underground to evaporate, or change into gases. The gases then rise through the soil to the ground surface where they are captured and cleaned up.

To expedite site cleanup, oxidants can be pumped into one well and out of another well. This approach helps to mix the oxidant with the harmful contaminant in the groundwater and soil. After the mixture is pumped out, it is re-circulated by pumping it back down the first well. As the pumping and mixing continues, more contaminated soil and groundwater are clean up. Of course, before wells can be drilled, the ground conditions (geology) of the soil and groundwater must be tested. Oxidants are corrosive, and can wear away certain materials and burn the skin.

Why use Chemical Oxidation?

Chemical oxidation can be very safe to use taking into consideration the potential hazards. Chemical oxidation is being used at hundreds of sites across the country. This technology can destroy contaminants underground without having to dig them up or pump them out for transport to a treatment facility. It also saves time and money, often being used to clean up contamination that other methods could not reach, like contaminants deep within the groundwater. Also, chemical oxidation generally offers fairly rapid cleanup times compared to other methods

References

- Navy, 2000. *DON Environmental Restoration SMART Cleanup for Future Generations*.

For further information visit:

<http://www.clu-in.org>

<http://www.rtdf.org>

<http://www.denix.osd.mil>